



**Alternative Fuels Data Center AFDC**

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Biodiesel (fatty acid alkyl esters) is a cleaner-burning diesel replacement fuel made from natural, renewable sources such as new and used vegetable oils and animal fats. Just like petroleum diesel, biodiesel operates in compression-ignition engines. Blends of up to 20% biodiesel (mixed with petroleum diesel fuels) can be used in nearly all diesel equipment and are compatible with most storage and distribution equipment. These low level blends (20% and less) don't require any engine modifications and can provide the same payload capacity and as diesel. Users should consult their engine warranty statement.

Higher blends, even pure biodiesel (100% biodiesel, or B100), can be used in many engines built since 1994 with little or no modification. Transportation and storage, however, require special management. Material compatibility and warrantee issues haven't been resolved with higher blends.

Using biodiesel in a conventional diesel engine substantially reduces emissions of unburned hydrocarbons, carbon monoxide, sulfates, polycyclic aromatic hydrocarbons, nitrated polycyclic aromatic hydrocarbons, and particulate matter. These reductions increase as the amount of biodiesel blended into diesel fuel increases. The best emissions reductions are seen with B100.

The use of biodiesel decreases the solid carbon fraction of particulate matter (since the oxygen in biodiesel enables more complete combustion to CO<sub>2</sub>) and reduces the sulfate fraction (biodiesel contains less than 24 ppm sulfur), while the soluble, or hydrocarbon, fraction stays the same or increases. Therefore, biodiesel works well with new technologies such as diesel oxidation catalysts (which reduce the soluble fraction of diesel particulate but not the solid carbon fraction).

Emissions of nitrogen oxides increase with the concentration of biodiesel in the fuel. Some biodiesel produces more nitrogen oxides than others, and some additives have shown promise in modifying the increases. More R&D is needed to resolve this issue.

Biodiesel has physical properties very similar to conventional diesel.

*Biodiesel's Physical Characteristics:*

|                               |                  |
|-------------------------------|------------------|
| Specific gravity              | 0.87 to 0.89     |
| Kinematic viscosity @ 40°C    | 3.7 to 5.8       |
| Cetane number                 | 46 to 70         |
| Higher heating value (btu/lb) | 16,928 to 17,996 |
| Sulfur, wt%                   | 0.0 to 0.0024    |

|                              |                  |
|------------------------------|------------------|
| Cloud point °C               | -11 to 16        |
| Pour point °C                | -15 to 13        |
| Iodine number                | 60 to 135        |
| Lower heating value (btu/lb) | 15,700 to 16,735 |

### FAQs

For answers to frequently asked questions, visit the National Biodiesel Board's "[FAQ page](#)." If you have further questions regarding biodiesel, please call the National Alternative Fuels Hotline at (800) 423-1DOE.

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